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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/780,989	02/09/2001	Timothy G. Adams	50376	5885

21874 7590 08/27/2003  
EDWARDS & ANGELL, LLP  
P.O. BOX 9169  
BOSTON, MA 02209

EXAMINER

THORNTON, YVETTE C

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 08/27/2003

13

Please find below and/or attached an Office communication concerning this application or proceeding.

AS13

# Office Action Summary

Applicati n N .

09/780,989

Applicant(s)

ADAMS ET AL.

Examiner

Yvette C. Thornton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspond nce address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 16-30,32,34-43,45,47 and 48 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16-30,32,34-43,45,47 and 48 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

This is written in reference to application number 09/780989 filed on February 9, 2001 and published as US 2002/0012869 A1 on January 31, 2002.

#### *Response to Amendment*

1. Claims 33 and 46 have been cancelled. Claims 26-30, 32, 34-43, 45 and 47-48 are currently pending.

#### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

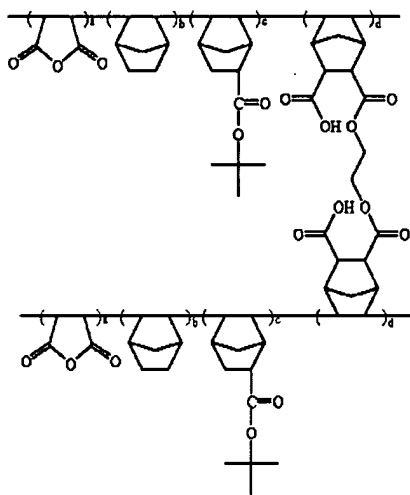
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 26-30, 32, 34-43 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US 6,200,731 B1) and further in view of Takeda et al. (US 6,156,481 A). Lee teaches a photoresist copolymer comprising (i) an alicyclic compound having an acid labile group as the first comonomer, (ii) a crosslinking monomer as the second comonomer and (iii) maleic anhydride and/or a compound of formula 16 as the third comonomer (c. 3, l. 61-c. 4, l. 10). The said crosslinking monomer is represented by formula 1 (c. 1, l. 65-c.2, l. 30). Lee exemplifies the synthesis of ethylene glycol di(5-norbornene-2-carboxylic acid-3-carboxylate) as the said crosslinking monomer (see ex. 1, c. 5, l. 55-c. 6, l. 25). The said compound is made by reaction of ethylene glycol and 5-norbornene-2-carboxylic acid-3-carboxylate. The said compound was polymerized with maleic anhydride,

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norbornene and t-butyl-5-norbornene-2-carboxylate to obtain a polymer having the following

&lt;Chemical Formula 18&gt;



structure:

(ex. 15, c. 12, l. 57-c, 13, l. 25). The polymer

obtained in example 15 was then admixed with triphenylsulfonium triflate as a photoacid generator and ethyl 3-ethoxypropionate solvent to obtain a photoresist composition. The said composition was spin-coated on a silicon wafer, baked, exposed to ArF laser (193 nm), post-exposure baked and developed to form a pattern (see ex. 17, c. 13, l. 65-c, 14, l. 10). It is the examiner's position that ethylene glycol is a well known and conventional crosslinking agent. Example 1 of Lee meets the limitation of the instant claim wherein a polymer is crosslinked by a separate crosslinker. The polymer of example 15 meets the limitations of a polymer that is completely free of aromatic groups having (1) units that are crosslinked to other polymer units (monomer d) and (2) tertiary non-cyclic photoacid labile groups (monomer c). The comprising language of the claims allows for the presence of additional monomers. The process of example 17 meets the process limitations of the instant claims wherein the composition is coated on a substrate, exposed to a wavelength of less than 200 nm and developed to form a pattern. Although Lee fails to exemplify an exposure step at 157

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nm, the disclosure clearly teaches that exposure can be done using a deep UV exposer or an excimer laser exposer such as ArF, KrF, VUV, EUV, E-beam, x-ray or the like. One of ordinary skill in the art could clearly envision using a VUV (157 nm) exposure (c. 5, l. 29-35).

Lee as discussed above teaches all the limitation of the claimed invention except the use of a divinyl ether crosslinking agent. Lee exemplifies the use of ethylene glycol, 1,3-propanediol and the like. Lee however fails to explicitly discuss the requirements for the crosslinking agent. Therefore one of ordinary skill in the art would have been motivated to use any crosslinking agent depending on the type of functionality desire within the polymer. Divinyl ethers are well known and conventional in the art. This position is supported by the teachings of Takeda (US 6,156,481), which discloses that exemplary divinyl ether compounds include ethylene glycol divinyl ether, 1,4-butanediol divinyl ether and 1,4-di(vinyl ether methoxy)benzene (c. 8, l. 7, l. 47-c. 8, l. 34). One of ordinary skill in the art would have been motivated to use any conventional crosslinking agent such as 1,4-butanediol divinyl ether to make the polymer of Lee depending on the type of functionality desired in the said polymer.

4. Claims 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US 6,200,731 B1) in view of Takeda (US 6,156,481 A) as applied to claims 26-30, 32, 34-43 and 45 above, and further in view of Varanasi et al. (US 6,140,015 A). Lee as discussed above teaches all the limitation of the claimed invention except an etching step as set forth in instant claims 47-48. It is the examiner position that a chemical etching step is well known and conventional in the art. This position is supported by the teachings of

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Varanasi (US 6,140,015 A), which teaches that the patterns formed from the photoresist structure can be transferred to the underlying substrate by reactive ion etching or some other type of etching technique. Thus making the resulting photoresist structure useful in making integrated circuits (c. 10, l. 13-25). One of ordinary skill in the art would have been motivated by the teachings of Varanasi to perform a conventional etching step on the formed patterns of Lee in order to make the structure useful in the field of integrated circuits.

### *Response to Arguments*

5. Applicant's arguments filed June 24, 2003 have been fully considered but they are not persuasive. Applicants argue that the combination of Lee and Takeda fail to render obvious the claimed invention because one of ordinary skill would not have any particular incentive to utilize a procedure involving phenolic moieties with non-phenolic systems. The examiner respectfully disagrees. Takeda is relied upon solely to teach what is well known and conventional in the art in regard to crosslinking agents. It is the examiner's position, as discussed above, that one of ordinary skill in the art would have been motivated to use any crosslinking agent in the process of Lee depending on the type of functionality desired within the polymer. Divinyl ethers are well known and conventional in the art. This position is supported by the teachings of Takeda (US 6,156,481), which discloses that exemplary divinyl ether compounds include ethylene glycol divinyl ether, 1,4-butanediol divinyl ether and 1,4-di(vinyl ether methoxy)benzene (c. 8, l. 7, l. 47-c. 8, l. 34). One of ordinary skill in the art would have been motivated to use any conventional crosslinking agent such as 1,4-butanediol divinyl ether to make the polymer of Lee depending on the type of functionality desired in the said polymer.

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6. Applicants further argue that the Varanasi et al. citation is similarly deficient and is specifically directed to particular phenolic polymers and there is no mention of vinyl ethers. The examiner, once again is of the position that Varanasi is relied upon solely to teach what is well known and conventional in the art in regard to process steps. This position is supported by the teachings of Varanasi (US 6,140,015 A), which teaches that the patterns formed from the photoresist structure can be transferred to the underlying substrate by reactive ion etching or some other type of etching technique. Thus making the resulting photoresist structure useful in making integrated circuits (c, 10, l. 13-25). One of ordinary skill in the art would have been motivated by the teachings of Varanasi to perform a conventional etching step on the formed patterns of Lee in order to make the structure useful in the field of integrated circuits.

7. The examiner maintains the position of record.

***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

9. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action.


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In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yvette C. Thornton whose telephone number is 703-305-0589. The examiner can normally be reached on Monday-Thursday 8-6:30.

11. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Janet C. Baxter can be reached on 703-308-2303. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

12. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1495.

yct   
August 20, 2003

  
JANET BAXTER  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700